METADATA SUBMISSION FORM
National Polar Data Center (NPDC) – NCPOR

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1. Basic Information

Field	Details
Metadata Title	Assessment of impact of climate change through integrated glaciological studies of Polar ice sheet between Polararboken and Dalk Glaciers, Larsemann Hills, East Antarctica.
Proposal / FSP ID	M4POS/NC/CHQ/2023/51149
Expedition	44th Indian Scientific Expedition to Antarctica (ISEA)
Field Season	2024 – 2025
Project / Mission	Mission-IV, Polar Studies Division, GSI

2. Principal Investigators

Role	Name	Designation	Organization
Principal Investigator	Deepak Yuvraj Gajbhiye	Senior Geologist	GSI, NCEGR, Faridabad
Co-Investigator	Mukut Singha Konwar	Senior Geologist	GSI, NCEGR, Faridabad

Affiliation:
Geological Survey of India (GSI)
Polar Studies Division
National Centre of Excellence for Geoscience Research (NCEGR), Faridabad

3. Geographic Coverage

Parameter	Details
Region	Larsemann Hills, Ingrid Christensen Coast, Princess Elizabeth Land, East Antarctica
Specific Location	Ice sheet between Polararboken Glacier and Dälk Glacier
Latitude Range	69◦25’S69◦25’*S* – 71◦25’S71◦25’*S*
Longitude Range	76◦08’E76◦08’*E* – 78◦48’E78◦48’*E*

Parameter	Details
Total Area Covered	~68,483 km²

4. Temporal Coverage

Field	Date
Start Date	December 2024
End Date	February 2025
Duration	Austral Summer (3 months)

5. Abstract / Description

The complex interplay of climatic and non-climatic factors governs the dynamics of the East Antarctic Ice Sheet in the Prydz Bay region. During the 2024–25 field season, integrated glaciological monitoring was conducted over 68,483 km² between the Dalk and Polararboken Glaciers (69°25'S–71°25'S; 76°08'E–78°48'E) using 25 stake networks (134 stakes) and 6 single stakes.

A net positive surface mass balance of **1.38 ± 0.12 Gt/yr** (specific balance: **0.20 m w.e.**) was recorded, with extreme spatial variability ranging from accumulation peaks at SN-20 (58.57 cm) to ablation at SN-10 (-20 cm). Ice velocity averaged **17.05 m/yr** (2.34 m/yr at coastal SN-1 to 67.58 m/yr at interior SN-13) under persistent NNW–N flow.

Climatic correlations showed coastal ablation sensitivity to temperature versus interior precipitation-driven accumulation. Landsat-2 derived NDSI maps validated snow-cover transitions and crevasses at glacier confluences, with DGPS data confirming accelerated discharge in Basin 12A. Long-term data (2013–2025) indicates sustained positive mass balance but rising volatility at climatic transition zones, underscoring localized topo-climatic controls on ice-sheet stability.

6. Keywords / Tags

Antarctic Glaciology, Larsemann Hills, Surface Mass Balance, Ice Dynamics, Climate Change, Dalk Glacier, Polararboken Glacier, Accumulation, Ablation, DGPS, NDSI, Ice Velocity, East Antarctica, Prydz Bay, Ice Sheet Mass Balance.

7. Dataset Variables / Parameters

S. No.	Parameter	Unit
1	Snow Accumulation / Ablation	cm/year
2	Ice Flow Velocity	m/year
3	GPS Coordinates (Latitude / Longitude)	Degrees, Minutes, Seconds

S. No.	Parameter	Unit
4	Snow Water Equivalent (SWE)	m w.e.
5	Snow Density (from ice cores)	kg/m³
6	Normalized Difference Snow Index (NDSI)	Unitless (-1 to +1)

8. Dataset Type & Format

Field	Details
Type	Observational / Field-based data
Data Formats	.xlsx (Excel), .csv, .pdf
Raw Data	Stake measurements, DGPS readings, ice core weights
Processed Data	Mass balance estimates, velocity contours, NDSI maps

9. Instrumentation / Methodology

- **Stake Network:** 25 stake farms (134 stakes) + 6 single stakes installed on ice surface.
- **DGPS (Differential GPS):** RTK mode for precise annual positioning (ice velocity).
- **Ice Core Drilling:** 1-meter ice cores with 10 cm diameter for density profiles.
- **Remote Sensing:** Landsat-8 data for NDSI mapping; REMA for DEM, hillshade, and aspect maps.
- **Meteorological Data:** AWS (Automatic Weather Station) data near Bharati Station.

10. Data Contact / Submission Details

Field	Details
Data Center	National Polar Data Center (NPDC), NCPOR
Email	npdc@ncpor.res.in
PI Email	deepak.gajbhiye@gsi.gov.in